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WT Docket No. 96-86

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ERICSSON INC.

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## **EXECUTIVE SUMMARY**

In the Notice of Proposed Rulemaking in WT Docket No. 96-86, the Commission is seeking to address the present deficiencies in public safety wireless communications. These deficiencies include lack of interoperability, minimal access to emerging technologies, limited service feature options, less than optimal transmission and reception quality, and lack of adequate spectrum. As part of its overall efforts to address these issues, the Commission and the National Telecommunications and Information Administration established the Public Safety Wireless Advisory Committee to provide advice and recommendations on the various requirements of public safety users through the year 2010. In September 1996, the PSWAC presented its final report to the Commission and the NTIA. Ericsson Inc., a major supplier of public safety land mobile radio equipment through its Private Radio Systems operation in Lynchburg, VA, has participated extensively in the work of the PSWAC.

With few exceptions, Ericsson fully supports the findings and recommendations contained in the PSWAC Final Report. Ericsson's primary concerns, as reflected in its comments, center around the economic structure and performance of the public safety segment of the land mobile radio equipment market.

With regard to interoperability, Ericsson supports the need for nationwide mutual aid/interoperability channels and the need for establishing a common mode of operation on those channels. In particular, Ericsson supports (a) the option of implementing interoperability at a minimum level within current public safety bands while creating a new Public Safety Interoperability Service (PI) in a centrally located band and (b) the choice of 25 kHz analog FM (with a later shift to 12.5 kHz FM) for the common mode of operation. The choice of analog FM technology has a number of advantages including (1) being backward compatible with the vast majority of the embedded base of public safety radio equipment, (2) being a well understood technology with widely available components, (3) being unencumbered with Intellectual Property Rights issues, (4) exhibiting a high degree of tolerance to co-channel interference which facilitates on-scene, unit-to-unit, infrastructure independent communications, and (5) facilitating

established at four equivalent voice paths per existing 25 kHz channel -- i.e., 6.25 kHz equivalent channel spacing representing a 4:1 gain in efficiency.

Ericsson agrees with the general approach used by the PSWAC in forecasting future spectrum needs and fully supports the conclusions reached by the PSWAC Steering Committee as to the current and future spectrum needs of public safety agencies. However, Ericsson is concerned that the PSWAC assessment is inconsistent with the rate at which the public safety market can and will adopt more spectrally-efficient technology under the FCC's current rules. Ericsson believes that the spectrum efficiency assumed by PSWAC can only be achieved by the public safety community if the FCC accelerates the shift to 6.25 kHz equivalent channel spacing to the year 1999. Ericsson is confident that it and other manufacturers will be able to deliver 6.25 kHz equivalent equipment by 1999 and strongly recommends that the Commission adjust its refarming rules accordingly.

Going beyond the adoption of 25 kHz analog FM as a common mode of communications, Ericsson agrees with the need to examine a baseline interoperability requirement in the evolving digital environment, but it has significant concerns about possible anti-competitive consequences if the *process* of establishing the resulting baseline technology is not properly designed. These concerns stem from (a) the fact that the public safety equipment market remains highly concentrated and dominated by a single firm with strong Intellectual Property Rights and (b) the documented problems associated with previous standards-setting activities in the industry. Ericsson strongly recommends that the Commission require any future effort to establish a baseline technology be conducted by an accredited standards-setting organization. If, however, a non-accredited standards-setting organization attempts to promulgate such standards, then such an organization should be required to follow and comply with the principles set forth in Section 273(d)(4) of the Communications Act. Requiring compliance with these principles will help ensure that the process is indeed fair and open as contemplated by the Steering Committee. Ericsson believes that ensuring a fair and open process is not only essential for producing a more competitive public safety communications market and networks with lower prices and advanced

infrastructure dependent interoperability through gateways. Importantly, because of (2) and (3), the adoption of analog FM technology for the common mode of operation would lower the economic barriers to entry into the public safety equipment market. This would produce important benefits in terms of increased competition and lower prices for PI Band radios and also permit individual manufacturers to develop highly sophisticated, spectrally-efficient new technologies while ensuring an enhanced level of interoperability with the embedded base of radios and with new equipment being developed by other manufacturers. In short, the combination of the PI Service/Band and utilization of 25 kHz analog FM as a common mode of communications would significantly improve the economic structure and performance of the public safety segment of the land mobile radio market by increasing competition while greatly facilitating interoperability.

Ericsson also agrees with the PSWAC Final Report that there is no single solution to the interoperability issue. Hence, Ericsson supports the notion that Federal, state, and local officials should encourage the deployment and utilization of (a) shared/consolidated systems and (b) gateways/interfaces between and among the remaining independent public safety infrastructures and between public safety and commercial infrastructures. Not only do shared/consolidated systems enhance interoperability, but they also provide a host of other advantages including improved spectrum efficiency.

With regard to the choice of a regulatory framework, Ericsson believes that it would be inappropriate and counter-productive for the Commission to dictate any technology or set of technologies beyond the use of 25 kHz analog FM to achieve interoperability. However, Ericsson strongly suggests that the Commission eliminate regulatory barriers to the use of more spectrally-efficient technologies (such as trunking in the public safety portions of the VHF and UHF bands), provide positive incentives for the use of more spectrally-efficient, advanced technologies (by, for example, granting exclusive channel use), and establish minimum levels of spectrum efficiency. With regard to the latter, Ericsson recommends that the spectrum efficiency standard be

features and functions, but it is also essential for allowing Ericsson and other manufacturers to develop and market even more spectrally-efficient public safety systems. More spectrally-efficient public safety systems will not only ensure that future public safety wireless communications capacity requirements are met, but also ensure that the valuable spectrum resource dedicated to public safety purposes is not wasted.

BEFORE THE  
FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20554

|                                      |   |                     |
|--------------------------------------|---|---------------------|
| In the Matter of                     | ) |                     |
|                                      | ) |                     |
|                                      | ) |                     |
| The Development of Operational,      | ) | WT Docket No. 96-86 |
| Technical, and Spectrum Requirements | ) |                     |
| for Meeting Federal, State and Local | ) |                     |
| Public Safety Communications         | ) |                     |
| Requirements Through the Year 2010   | ) |                     |

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COMMENTS OF  
ERICSSON INC.

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**I. INTRODUCTION**

In the Notice of Proposed Rulemaking in the above-captioned docket,<sup>1</sup> the Federal Communications Commission ("Commission") is raising issues the resolution of which will have a profound effect upon the public safety community and, hence, upon the future safety of life and property for all Americans. Ericsson Inc. ("Ericsson"), with nearly 7,000 employees in the United States, is a major participant in the wireless communications marketplace and, in particular, through its Private Radio Systems operation in Lynchburg, VA, it is a major supplier of public safety land mobile radio equipment and systems. As a major provider of wireless equipment and

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<sup>1</sup> The Development of Operational, Technical, and Spectrum Requirements for Meeting Federal, State and Local Public Safety Agency Communications Requirements Through the Year 2010, WT Docket No. 96-86, FCC 96-155, released April 10, 1996 ("Notice").

systems, and recognizing the importance of effective and efficient public safety wireless communications to the safety of life and property and to law enforcement more generally, Ericsson is pleased to submit these comments in response to the Notice.

By way of background, Ericsson is recognized as an international leader in the telecommunications industry with 85,000 employees worldwide, business partnerships in more than 100 countries, 18,000 employees in 22 countries active in Research and Development, and \$15 billion in net sales in 1995. Approximately 40 percent of the world's mobile telephone subscribers are connected to Ericsson supplied systems. Ericsson's presence in the United States dates back to the turn of the century. Of particular relevance to this proceeding is the fact that in 1989 Ericsson and General Electric formed a joint venture named Ericsson GE Mobile Communications Inc. ("EGE"). In 1995, the EGE name was formally changed to Ericsson Inc. Ericsson Inc. (USA) is headquartered in Richardson, Texas, and as noted above, employs approximately 7,000 employees in the United States. Ericsson Private Radio Systems is located in Lynchburg, Virginia.

In the instant proceeding, the Commission is seeking to address the present deficiencies in public safety wireless communications including its expanding spectrum needs. As identified by the Commission in the Notice, these deficiencies include lack of interoperability, minimal access to emerging technologies, limited service feature options, less than optimal transmission and reception quality, and lack of adequate spectrum. As part of its overall efforts to address these issues, the Commission and the National Telecommunications and Information Administration ("NTIA") established the Public Safety Wireless Advisory Committee ("PSWAC" or the "Advisory Committee") to provide advice and recommendations on the various requirements of

public safety users through the year 2010. On September 11, 1996, PSWAC presented its final report to the Commission and NTIA.<sup>2</sup>

Representatives of Ericsson participated in all of the formal meetings of the Advisory Committee and its various Subcommittees as well as in countless informal working group meetings. With few exceptions, which we will address in detail below, Ericsson fully supports the key findings and recommendations of the PSWAC Final Report. In particular, Ericsson believes that the PSWAC Final Report makes a clear and convincing case of the need for additional spectrum and the most efficient use of the presently allocated spectrum if public safety agencies are to fulfill their responsibilities.

Some indication of the importance of public safety agencies having access to adequate spectrum can be gleaned from some basic statistics on (1) the amount of money spent on public safety services in the U.S. and (2) the losses in terms of lives and property that occurred despite those expenditures. For example, the U.S. Bureau of Census reports that in 1992,<sup>3</sup> all levels of government spent the following amounts on these public safety-related activities:<sup>4</sup>

|                   |          |
|-------------------|----------|
| Police Protection | \$41.2 B |
| Fire Protection   | 14.4 B   |
| Corrections       | 31.0 B   |

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<sup>2</sup> Final Report of the Public Safety Wireless Advisory Committee to the Federal Communications Commission and the National Telecommunications and Information Administration, September 11, 1996 ("PSWAC Final Report").

<sup>3</sup> The 1992 figures were the most recent available to us in the preparation of these comments. The Commission may wish to ask commenting parties in this proceeding to provide more recent figures.

<sup>4</sup> U.S. Bureau of Census, Series GF, No. 5. (Also see Statistical Abstract of the United States 1995, U.S. Department of Commerce, p. 300.)



Thus as far back as 1992, the total cost of these public safety-related activities was over \$85 billion and is likely to be well over \$100 billion today. In addition, the National Fire Protection Association estimates that in 1995, fire caused \$8.9 billion in direct property damage and resulted in 4,585 civilian deaths and 25,775 civilian injuries.<sup>5</sup> The Federal Bureau of Investigation reports the following losses from crime in 1995:<sup>6</sup>

|                     |         |
|---------------------|---------|
| Robbery             | \$ .5 B |
| Burglary            | 3.3 B   |
| Larceny-Theft       | 4.3B    |
| Motor Vehicle Theft | 7.6B    |

A study recently released by the National Institute of Justice of the U.S. Department of Justice estimated that the annual cost of victim crime is \$450 billion when medical expenses, lost earnings, pain and suffering, and other factors are included.<sup>7</sup> Finally, according to the Bureau of Labor Statistics of the U.S. Department of Labor, 174 police officers and detectives and 39 fire fighting and fire prevention personnel suffered fatal occupational injuries in 1995.<sup>8</sup>

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<sup>5</sup> "1995 Fire Death Toll a Sobering Reminder of the Nation's Vulnerability to Fire," National Fire Protection Association, August 15, 1996 (<http://www.wpi.edu/Academics/Depts/Fire/Nfpa/newsrelease.html#1>).

<sup>6</sup> "Crime in the United States," Federal Bureau of Investigation, U.S. Department of Justice, October 13, 1996 (<http://www.fbi.gov/ucr95prs.htm>).

<sup>7</sup> "Victim Costs and Consequences: A New Look," National Institute of Justice Research Report, January, 1996 (<http://www.ncjrs.org/txtfiles/victcost.txt>).

<sup>8</sup> "National Census of Fatal Occupational Injuries, 1995," Bureau of Labor Statistics, U.S. Department of Labor, August 8, 1996 (<ftp://stats.bls.gov/pub/news.release/cfoi.txt>).

A fundamental conclusion of the PSWAC Final Report is that “unless immediate measures are taken to alleviate spectrum shortfalls and promote interoperability, Public Safety agencies will not be able to adequately discharge their obligation to protect life and property in a safe, efficient, and cost effective manner.” Given the basic statistics presented above, it is clear that even minor reductions in the safety, efficiency, and cost-effectiveness of public safety agencies could have major economic consequences, while putting into jeopardy the lives of those individuals entrusted with protecting life and property. It is also clear that even small percentage reductions in these annual costs and the total annual costs of public safety activities would more than compensate for any reduction in one-time spectrum auction revenues that might be foregone by allocating additional spectrum for public safety purposes.

The PSWAC consisted of a Steering Committee and five functional subcommittees: Operational Requirements Subcommittee (“ORSC”), Technology Subcommittee (“TESC”), Interoperability Subcommittee (“ISC”), Spectrum Requirements Subcommittee (“SRSC”), and Transition Subcommittee (“TRSC”). Each of these subcommittees submitted separate reports to the Committee. These reports were summarized in the body of the PSWAC Final Report and the full reports from each subcommittee were included as appendices in that document. The PSWAC Final Report makes clear that, while it is predicated on the work of the five subcommittees, it departs from the various subcommittee reports in some respects.

The Commission’s Notice in this proceeding tracks the organizational structure adopted by PSWAC to carry out its charter. In other words, the Commission organized the matters upon which it sought comments into the same five categories of interoperability issues, operational issues, technology issues, spectrum allocation issues, and transition issues. Ericsson has

organized its comments in the same general format. Under each major category, we will briefly state the issue and comment on the findings and recommendations relating to the issue in the PSWAC Final Report. Since, with few exceptions, Ericsson fully supports these findings and recommendations, our comments are principally aimed at providing additional supporting information relating to the findings and offering specific suggestions for implementing the associated recommendations.

In addition to seeking information on issues falling into each of these five categories, the Commission in its Notice also sought comments on competitive issues associated with the supply of public safety goods and services. Ericsson has strong concerns about the structure and performance of the public safety segment of the land mobile radio market and expressed those concerns early in the PSWAC process.<sup>9</sup> Because of those concerns, and because, in general, the PSWAC Final Report does not deal with the competitive issues, Ericsson is taking this opportunity to comment extensively on them. Our comments regarding these competitive issues are contained in Section II.F., below.

## **II. SECTION-BY-SECTION COMMENTS**

### **A. Interoperability Issues**

#### **1. "Public Safety" Definition**

As described in its Notice, the Commission currently defines "public safety services" by enumerating the services falling into that category. The definition of public safety is critical to estimating future spectrum requirements for public safety services and for providing for

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<sup>9</sup> Letter to Philip L. Verveer, Chair, PSWAC, from Dennis C. Connors, Vice President, Ericsson Inc., dated October 24, 1995.

interoperability. For example, a narrow definition of public safety would tend to minimize the total spectrum requirements, but at the risk of excluding entities (e.g., privately owned utilities) that provide vital facilities and services whose maintenance and restoration of which may require coordination with more traditionally defined public safety agencies. Excluding certain services would, presumably, subject them to auctions for the spectrum they require and potentially exclude them from operating on designated interoperability channels. On the other hand, a broad definition of public safety would tend to maximize the total spectrum requirements, making it more difficult for the Commission to accommodate the legitimate needs of the public safety community for more spectrum and reducing the amount of spectrum subject to auction.

To guide its own deliberations in this area, the PSWAC adopted a set of definitions relating to public safety, and the Commission, in its Notice, proposed to adopt those definitions “in an effort to encompass the broadest array of the responsibilities and functions provided by public safety agencies.”<sup>10</sup> The definitions included definitions of public safety and public service. Ericsson supports the set of definitions adopted by the PSWAC. We note that these definitions amount to policy definitions as opposed to legal definitions. Thus, as we understand it, the policy definitions would be used by the Commission in deciding whether a particular service fell into the public safety or public service category. While the PSWAC Final Report is somewhat unclear on the point, it is our further understanding that, under its recommendations, the services that would fall into the public safety category in the future are the same as the services licensed today.

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<sup>10</sup> Notice at para. 25.

Under the proposed definitions, public services (as opposed to public safety services) would include services provided by entities that furnish, maintain, and provide the nation's basic infrastructures which are required to promote the public's safety and welfare. The importance of this definition is that it recognizes, as the Commission did in its Notice, that organizations such as utilities, pipeline companies, petroleum companies and railroads (a) are involved in the provision of basic infrastructures that are critical to the public's safety and welfare, (b) can be involved in, for example, emergency responses following manmade or natural disasters, and (c) may require close coordination between them and public safety entities if they are involved in such emergency activities. Hence, Ericsson supports the notion that provisions should be made for sets of common radio channels in the VHF, UHF and 800/900 MHz bands to allow such coordination to take place.<sup>11</sup>

## 2. Interoperability Definition

As in the case of public safety, PSWAC adopted a formal definition of interoperability and related terms to provide guidance in its own deliberations and, in its Notice, the Commission has proposed to adopt the same set of definitions. Ericsson was an active participant in the PSWAC deliberations in the interoperability area and supports the adoption of the interoperability and related definitions by the Commission.

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<sup>11</sup> We note that the Transition Subcommittee has set forth a proposal for three categories of service pools in the event that current service pools are consolidated. The three categories proposed are (1) public safety, (2) public service and (3) business/commercial. The proposal includes a ranking of the categories and certain restrictions on interservice sharing based on the ranking. Since public service entities operate outside the traditional definitions of public safety and, therefore, outside the scope of the instant docket, Ericsson recommends that such issues be dealt with in a further or separate rulemaking proceeding.

### 3. Interoperability Needs

In its Notice, the Commission identified the need to facilitate interoperability as an essential component of its efforts to improve public safety communications and went on to state that "We believe that the present inability of public safety agencies to communicate with each other is one of the most critical deficiencies in today's public safety communications."<sup>12</sup> Similarly, a key finding of the PSWAC Final Report is that "Interoperability among and between different classes of users and different jurisdictions is critical to the effective discharge of Public Safety duties."<sup>13</sup> Ericsson agrees with both the Commission and the PSWAC that interoperability is critical to public safety communications. Because of the importance of the interoperability issue, Ericsson prepared and submitted to the ISC a white paper on the subject. The white paper (designated PWAC/ISC 95-10-030/2 in the PSWAC document numbering system) has been submitted to the Commission as Attachment 3 of the ISC Final Report dated July 29, 1996.

The Commission, in its Notice, stated that it believed that the need for interoperability in public safety communications arises in three general contexts -- day-to-day operations, mutual aid incidents, and task force operations. Likewise, the Ericsson Interoperability White Paper referenced immediately above analyzed interoperability requirements and potential solutions using the same framework.<sup>14</sup> Finally, the PSWAC Final Report, and the ISC Final Report upon which it was based, described essentially the same three requirements, albeit in more detail. Ericsson

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<sup>12</sup> Notice at para. 22.

<sup>13</sup> PSWAC Final Report at para. 2.1.5.

<sup>14</sup> The three interoperability missions identified in the Ericsson Interoperability White Paper were, in turn, based on a September, 1995, AFCEA presentation by John Powell representing the Association of Public Safety Communications Officials ("APCO").

agrees with the Commission's conclusion that this framework adequately describes the contexts in which public safety interoperability is required. Furthermore, the need for improved interoperability in the three contexts of day-to-day, mutual aid, and task force operations has been clearly demonstrated by the extensive documentation submitted in the ISC Final Report and by the key findings of the PSWAC final report of which it is a part.

One key finding of the PSWAC Final Report is that "Interoperability between Public Safety users in the past has been hampered by an independent set of factors that includes widely dispersed and fragmented spectrum allocations that cannot be covered by multiband radios, nonstandard frequency spacings and system access methods, and the lack of clear, nationwide channels allocated solely for interoperability."<sup>15</sup> Ericsson supports this key finding regarding interoperability, but would also call the Commission's attention to a conclusion in the ISC Final Report that "A lack of established policies and procedures among public safety agencies and public service organizations has contributed to the interoperability problem." In the Ericsson White Paper, we state that "The real tragedy of the Polly Klaas case in terms of radio equipment, was [that] the technology allowed the system to interoperate between adjacent counties, however, interoperation was not part of routine procedures." Therefore, it is our strongly held belief that the options for enhancing interoperability should not only include means for addressing technological factors, but also organizational, operational, and procedural factors as well.

#### 4. Interoperability Options

In the Notice, the Commission suggested that, in addition to certain existing means, there were three primary options for achieving better interoperability. *First*, it could relocate all public

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<sup>15</sup> PSWAC Final Report at para. 2.1.4.

safety communications to a new radio band and require radios to scan and operate on all channels in the band. *Second*, it could designate certain channels as mutual aid channels and require new public safety equipment to operate on all designated mutual aid channels. In this option, interoperability would be achieved by employing multi-band radios or separate, dedicated radios. *Third*, the Commission could require the deployment of multi-channel, cross-band repeaters which could repeat (relay) communications on universally designated channels in each of the public safety bands.

Having outlined these options and addressing some of their advantages and disadvantages, the Commission tentatively concluded that the second option, establishing new universal mutual aid channels, was an effective first step in providing for interoperability among Federal, state and local public safety agencies. It based this tentative conclusion on the fact that this option had the advantage of allowing public safety agencies to continue to operate their existing equipment while achieving improved interoperability. The Commission then goes on to seek comments on certain specific proposals assuming the designation of the universal mutual aid channels. Among these are proposals dealing with the number of channel pairs that should be so designated, whether operations on the designated channels should be subject to a system of priorities, and equipment requirements associated with operation on the designated channels.

In its key findings, the PSWAC Final Report rejected the option of reallocating public safety communications to a new radio band. In doing so, it stated that:

Reallocating all Public Safety users to a single new band is not feasible due to the need to maintain different [radio] propagation characteristics for different Public Safety missions, the cost of replacing the embedded base of Public Safety Radio



equipment, and the lack of any single block [of spectrum] of sufficient size to accommodate all Public Safety users.<sup>16</sup>

Ericsson supports this conclusion for the reasons stated therein and hence recommends against the Commission's first option.

The ISC Final Report identifies and analyzes multiple levels of interoperability solutions that generally encompass and expand the options discussed in the Commission's Notice.<sup>17</sup> The ISC Final Report usefully distinguishes between infrastructure independent and infrastructure dependent interoperability solutions or methodologies. Infrastructure independent methodologies are based on establishing communications links directly between radios using a direct radio path. Infrastructure dependent methodologies, on the other hand, require the use of some item or items of equipment, other than the end user unit (radio), to establish the needed communication links.

Selecting from among these options, the PSWAC Final Report concludes that the present limitations on interoperability can be eased by establishing bands of frequencies for interoperability purposes, encouraging the development and use of shared systems, and building gateways<sup>18</sup> between technically incompatible systems.<sup>19</sup> The PSWAC Final Report also supports coordinated planning at the Federal, state, and local levels of government in order to facilitate

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<sup>16</sup> PSWAC Final Report at para. 2.1.11.

<sup>17</sup> Alternatives for Enhancing Public Safety Interoperability are summarized in a table beginning on p. 54 of the ISC Final Report.

<sup>18</sup> The word "gateway" is used as a general term for various methods for providing interconnection between and among public safety (and commercial) wireless systems.

<sup>19</sup> PSWAC Final Report at page 2 (Executive Summary).

interoperability<sup>20</sup> and it specifically recommends a management structure be established in order to oversee the operation on the bands established for interoperability purposes.<sup>21</sup>

As an introductory comment, Ericsson would like to stress a point that became very apparent during the PSWAC deliberations dealing with interoperability; namely, there is no single solution that will solve the inter-agency interoperability problem for the public safety community, due to the unique geographic conditions and differing regional requirements across the country.<sup>22</sup> Rather, it is only by combining various options in a coordinated fashion that the desired high level of interoperability can be achieved.

With regard to establishing new frequencies for interoperability purposes, the PSWAC Final Report supports the allocation of 2.5 MHz of spectrum for interoperability purposes in the VHF and UHF bands between 138 MHz and 512 MHz. The PSWAC Final Report itself (as differentiated from the ISC Final Report) does not endorse any particular plan for utilizing existing designated interoperability channels, new interoperability channels within existing bands, or new interoperability channels within any new public safety spectrum. The ISC Final Report, on the other hand, considered two options for distributing interoperability channels. The first option is to implement interoperability within existing public safety bands, and the second is to implement interoperability at the minimum level within current public safety bands while providing the majority of the interoperability channels within a new Public Safety Interoperability Band in

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<sup>20</sup> PSWAC Final Report at para. 2.2.6.

<sup>21</sup> PSWAC Final Report at para. 2.2.1.

<sup>22</sup> ISC Final Report at para. 10.0.

spectrum below 512 MHz.<sup>23</sup> The latter option involves the idea of creating a single, common Public Safety Interoperability Service (abbreviated “PI”) in one central band. This band would be used exclusively for interoperability purposes and, according to the concept developed within the ISC, the Commission and NTIA would freely license these frequencies to all eligible public safety/public service providers under operational as well as technical regulations that would, among other things, restrict their use to mutual aid interoperation. While the idea of the PI Service/Band was introduced late into the ISC’s deliberations, the ISC recommended the second of the two options.

Ericsson agrees with the Commission and with the PSWAC Steering Committee that nationwide mutual aid/interoperability channels should be established. While its implementation would require the use of a second “emergency radio” or dual band radio, Ericsson strongly supports the PI Service/Band as long as 25 kHz analog FM is selected as the common mode of operation in the new band. By utilizing 25 kHz analog FM, the PI Service/Band would have the advantages ascribed to it in the ISC Final Report while, at the same time, promoting competition in the provision of public safety equipment. The pro-competitive and other benefits of choosing 25 kHz analog FM as a common mode of operation are presented later in this section.

Ericsson further suggests that gateways be established linking the new mutual aid/interoperability channels in the PI Band with five currently designated mutual aid channels in the 800 MHz band. We make this suggestion because the 800 MHz band will continue to be used extensively for public safety purposes. It will continue to be used extensively because of its

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<sup>23</sup> ISC Final Report at para. 11.2.1.

desirable propagation characteristics and the lack of other available spectrum in major urban areas.

Like the Steering Committee, Ericsson is also encouraged by the trend toward the deployment and utilization of shared/consolidated systems.<sup>24</sup> As a supplier of many of the world's largest, multi-site, trunked, private land mobile radio systems, Ericsson has seen firsthand the benefits of such systems. As pointed out in the PSWAC final report, shared/consolidated systems readily provide interoperability to those agencies sharing the system. Not only do these systems facilitate interoperability, they can also offer (1) a host of technically advanced features and functions that may not be economical on smaller systems, (2) the benefits of economies of scale more generally, and, at the same time, (3) significant improvements in spectrum efficiency. The latter, the improvements in spectrum efficiency, stems from two factors. First, interoperability can be achieved without additional spectrum -- it is inherent in the system. Second, when channels are collected into larger groups and trunked, the capacity per channel increases. In the Notice, the Commission assumed that trunked systems have a 2.7 times efficiency advantage over non-trunked systems using the same number of channels.<sup>25</sup> Ericsson's own modeling and experience support this assumption. Finally, reducing the number of independent systems reduces the number of gateways required to achieve interoperability by that means. Because of these benefits, Ericsson strongly supports the notion that the Commission (and Federal/state/local officials) should encourage the deployment and utilization of shared/consolidated systems.

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<sup>24</sup> PSWAC Final Report at para. 2.2.10.

<sup>25</sup> Notice at para. 65.

As discussed at some length in the PSWAC Final Report and in the ISC Final Report upon which it draws, gateways can interconnect systems operating in different frequency bands, using different modes of operation (e.g., trunked or non-trunked), and/or utilizing different protocols. While gateways, and infrastructure dependent alternatives more generally, have certain disadvantages, they provide one of the few available ways of enhancing interoperability in the short term. Moreover, as pointed out before, public safety agencies will almost certainly continue to operate over a wide range of frequency bands because of the different radio propagation characteristics and the lack of any single block of spectrum large enough to accommodate all public safety users. Thus, it appears evident to us that, even if the number of independent systems is reduced through the use of shared/consolidated systems, gateways will remain an important method of achieving interoperability even in the longer term. Also, as explained in more detail in Section II.F. below, gateways can increase competition in the provision of public safety services and equipment, with concomitant increases in price competition, faster technological innovation, and improved spectrum efficiency. For these reasons, Ericsson strongly supports the Steering Committee's recommendation that "The development, provision and utilization of interfaces/gateways between and among remaining independent Public Safety and public service infrastructures and between Public Safety and commercial infrastructures should be encouraged."<sup>26</sup>

Because of the importance of interoperability, the Commission, in its Notice, proposes to adopt rules that would require public safety equipment to have a common mode and frequency band. It also asks if its rules should specify a type of emission or multiple emissions and who

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<sup>26</sup> PSAWC Final Report at para. 2.2.11.2.

should make the decision on the emissions to be adopted. Finally, it asks whether its rules should require that all radios which are type accepted or sold for use on public safety channels should be capable of operating on the designated mutual aid channels. In the PSWAC Final Report, the Steering Committee recommends that a minimum baseline standard be established for public safety radio equipment. As summarized in the PSWAC Final Report, the Interoperability Subcommittee went well beyond this general endorsement of a minimum baseline standard by unanimously adopting for unit-to-unit voice communications interoperability, the minimum baseline standard of 25.0 kHz FM for operation on public safety mutual aid/interoperability channels in the frequency range between 30 and 869 MHz.<sup>27</sup> Effective January 1, 2005, the minimum baseline technology for unit-to-unit voice interoperability would change to 12.5 kHz in public safety spectrum in the frequency range between 30 and 512 MHz.<sup>28</sup>

Ericsson strongly supports the Commission's proposal to require a common mode of operation and the corresponding Steering Committee recommendation for a minimum baseline standard for public safety radio equipment. In addition, Ericsson strongly endorses the ISC recommendation that the common mode of operation be 25 kHz analog FM with a shift in the year 2005 to 12.5 kHz analog FM. Ericsson does so for the following reasons:

*First*, 25 kHz analog FM is backward compatible with the vast majority of the embedded base of public safety radio equipment. As we pointed out before, this means that, in some cases at least, enhanced interoperability can be achieved by merely retuning existing radios.

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<sup>27</sup> ISC Final Report at para. 11.2.4.

<sup>28</sup> In both cases, the ISC proposes that (a) the minimum baseline technology for interoperability be changed if the Commission and/or the NTIA stipulates a different emission in a specific operational band and (b) the maximum allowable interoperability bandwidth not exceed the bandwidth established for operational bandwidth within the new spectrum.

*Second*, analog FM technology has been used in private land mobile radio applications for over fifty years. Hence, the technology is well understood and the components required to build an analog FM radio as a standalone unit or into another radio are widely available at low cost.

*Third*, and related, analog FM radio technology is unencumbered by Intellectual Property Rights (“IPR”) issues. In other words, manufacturers can produce the equipment with little concern about infringing on patents or copyrights held by others and without paying excessive royalties.

*Fourth*, in combination, the second and third reasons mean that the economic barriers to providing such radios are low which, in turn, facilitates the entry of even small firms into the market with attendant benefits in terms of increased competition and lower prices.

*Fifth*, because of the so-called capture effect, analog FM systems exhibit a high degree of robustness. That is, they are relatively tolerant of co-channel interference. This means that, while handling a single voice conversation in a single 25 kHz channel may not appear spectrally-efficient at first glance, in the direct unit-to-unit, infrastructure independent mode, the use of robust and low power analog FM permits a significant amount of geographic frequency reuse. This significantly increases the achieved spectrum efficiency. Of course, direct unit-to-unit, infrastructure independent interoperability is critical in many, if not most, mutual aid operations.

*Sixth*, using 25 kHz analog FM as the common mode of operation permits manufacturers such as Ericsson to develop highly sophisticated, specialized, spectrally-efficient new technologies in competition with other manufacturers while ensuring an enhanced level of interoperability with the embedded base of radios and with new radios being developed by other equipment producers.

*Seventh*, using analog FM avoids any extra delay caused by digital recoding in a gateway. Ericsson expects that digital voice technology will be used in many, if not most, future public safety communications systems. Coding signals for digital voice systems imposes delay and recoding signals originally transmitted in one digital format to a different digital format imposes additional delays. This recoding may very likely degrade service. Analog FM does not incur this additional delay for recoding. Use of narrowband digital coding on the interoperability channels would require either (1) acceptance of the recoding delay and the likelihood of degraded service, or (2) utilizing the same digital voice compression technology, with its attendant chilling effect on innovation introduction, spectrum efficiency and competition, in all public safety communications systems.

In order to enhance interoperability among public safety entities, Ericsson believes that all radios type accepted or sold for use on public safety operational channels in a given band should

be capable of operating on the designated mutual aid/interoperability channels associated with that band. However, because of cost and technical/performance limitations, the radios should not be required to operate on mutual aid/interoperability channels outside of the band for which the radio is type accepted. Of course, there should be no restriction on equipment suppliers having type accepted and selling radio equipment whose sole purpose is to support interoperability on the new interoperability channels within existing bands or in the proposed PI Band. This will enable entities/users to enhance interoperability with other public safety and public service entities simply by purchasing dedicated radios for that purpose and without impacting on their existing system, if any.

While the use of 25 kHz analog FM as the common mode of operation has many advantages, concerns have been expressed that, in the long term, the conversion to all-digital systems may make it obsolete or otherwise inappropriate. Hence, the ISC has recommended that further efforts be undertaken to address the need for a baseline technology for interoperability in the evolving digital environment. Ericsson agrees with the need for continuing efforts in this regard, but has significant concerns about potential anti-competitive consequences if the dominant provider in the existing concentrated market is able to unduly influence the process for its own competitive gain and thus produce a flawed result.

## **B. Operational Issues**

In its Notice in this proceeding, the Commission describes public safety wireless communication systems today and then seeks comments on (1) the types of services and features that public safety agencies need to accomplish their missions and (2) the public safety equipment and system requirements needed to meet those needs. With regard to the types of services and



features needed by public safety agencies, the PSWAC Final Report and the ORSC Final Report detail at length how public safety users have operational requirements that differ substantially from other classes of wireless users. Clearly, users are in the best position to determine their operational requirements, and Ericsson generally agrees with the requirements identified and with their unique characteristics. Nonetheless, as a major supplier of land mobile radio equipment, we would emphasize -- as does the Steering Committee -- that while public safety agencies have certain common, overarching needs, they also have specialized requirements based on their specific missions and operating environments. Hence, no two systems are apt to have identical needs and requirements. For example, while one entity may have a requirement for real time video transmission, another agency may need only conventional radios to meet its communications needs. For this reason, it is important to recognize that blanket operational requirements may represent more of a "wish list" than a compilation of the needs of any single agency.

As part of its gathering of information, the Commission inquired as to what extent commercial providers might meet public safety communications requirements. Once again, the PSWAC Final Report and the accompanying ORSC Final Report deal with this issue at some length. The Steering Committee concludes that the unique operational requirements "complicate the wholesale substitution of commercial services for the dedicated networks currently owned and operated by Public Safety entities."<sup>29</sup> However, it goes on to conclude that "Commercial wireless systems...are evolving rapidly and may offer tangible and reasonable alternatives to the demand

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<sup>29</sup> PSWAC Final Report at para. 1.23.